

# PACIFIC DISCOVERY



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Founded in 1853

# A JOURNAL OF NATURE AND MAN **PACIFIC DISCOVERY** IN THE PACIFIC WORLD

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"THE DESERT has had big rains. A wildflower crop is almost a dead certainty," Edmund C. Jaeger writes, as we go to press, from his home in Riverside near the edge of California's Colorado Desert. We note this with mixed feelings of triumph and relief. It must have been more than two years ago that Don Ollis of Santa Barbara, one of *PD*'s contributing photographers, sent in a superb set of desert wildflower photographs. We accepted them with the understanding that publication would wait for suitable accompanying text, and a spring when the desert bloomed. Hopefully, we asked Mr. Jaeger last year to write story and captions for Don Ollis' pix. We asked Don Ollis to enlarge one we selected for a cover. Then we waited for spring—a spring following a wet winter. More days than usual this California winter (Chambers of Commerce: please skip this), we have watched from our editorial window the rain beating down copiously on Golden Gate Park, and we have kept mop and bucket busy in our Marin County basement. We have prayed hard, each storm, that there was plenty of the stuff left for the area between Los Angeles and Yuma. There was. Mr. Jaeger has confirmed it, with his copy already in. The March-April 1952 *PD* will bloom after the big rains.

**Erratum in Errata** — or How Wrong can an Editor get? After blandly repeating (this column, September-October 1951) treasure-hunter Rieseberg's slip which put Manta Bay in Peru instead of Ecuador where it belongs, we made a last-minute check and corrected the ms. ("Cocos Island and the 'Loot of Lima'") before going to press for November-December. All well and good — then we decided to clinch it in "Errata" for 1951. We did! — "For PERU's read CHILE's." That's what it says. Our latest decision? — to go on a long cruise to Ecuador, Peror, and Chilu. Its the dry season down around Manta Bay, if we're not mistaken.

IN REPLY to our letter accepting "Las Tinajas Altas," Harold O. Weight said: "For several years my wife and I . . . had the idea of a publication for presenting Western and Southwestern material which we feel did not have a wide enough market. Some of it is perhaps too factual for the glamor angle many magazines require. A great deal of it is work already done — but filed away in archives or long out of print — which we felt should be made available to the reader who didn't have a Bancroft or Huntington library available and couldn't afford a library of rare Western Americana. Since we have been frequent visitors to the ghost camp of Calico and knew of the *Calico Print*, which was the town's weekly newspaper in the 1880's, we had toyed with the idea of reviving it. . . ." The January 1952 *Calico Print* (address: Twentynine Palms, Calif.), on our desk, is vol. VIII, no. 1. It features Casa Grande National monument, with a well documented article by Editor Weight, and excerpts from the early descriptions of the great prehistoric structure by Kino, Manje (or Mange), and Font. This should be read along with Corle's *The Gila* (see Reviews). . . . ¶Academy Curator of Botany John Thomas Howell and photographer M. Woodbridge ("Woody") Williams have again joined pen and lens on California flora, this time the "Bishop Pines." . . . ¶In describing her entomologist husband's "Collecting on Si-shan," Roxana S. Ferris in modesty does no more than hint at her own scientific interests — her address is Stanford University's Dudley Herbarium. . . . ¶Part of the installation of "Africa by the Golden Gate" was described in the picture story of mounting big game animals in the November-December 1950 *PD*. Lawrence A. Williams, Academy science writer and editor of the *News Letter*, and the famous western photographer, Ansel Adams join talents to bring the account of Simson African Hall up to date.

D.G.K.

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The cones of the bishop pine cluster around the branch, their sharp-spined scales remaining closed until opened by the heat of fire. Woody Williams photographed these matured cones on Inverness Ridge, Marin County, California.

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GENERALLY SPEAKING we do not propose to review books in the editorial columns of *Pacific Discovery*, since another part of the magazine is set aside for that purpose. But occasionally we find a book that lends itself particularly to editorial comment. One that we mentioned in passing in our last issue, *Time's Arrow and Evolution* by H. F. Blum (Princeton University Press, 1951, xi + 222 pp., \$4.00), is such a book.

We could advance several reasons. Dr. Blum is a gifted writer, a profound thinker, and a man of remarkably wide scholarly attainments. He is a leading authority on photobiology, a member of the National Cancer Institute, a lecturer at Princeton University, and — last but not least — a Fellow of the California Academy of Sciences and a member of one of its standing committees on research. In this book he has been able to bring together a remarkable amount of information from the fields of physics, physical and organic chemistry, earth history, physiology, and genetics, to bear on the problems of organic evolution. To read it is like taking a "refresher" course in half a dozen sciences; and after reading it we went around for days practically bristling with information and dumbfounding our colleagues with our newly acquired erudition.

However, the real reason that *Time's Arrow and Evolution* makes our editorial columns is a simple, practical one. We started to write it up for the "Reviews" section on page 29; but after pounding on the typewriter for a couple of hours, we discovered that we had used up all the space allocated to the review just discussing the title, without ever having got around to the book itself. So what started out to be a book review has become an editorial because this is the only place in the magazine where we have enough room to comment in any-thing approaching an adequate manner.

By the same token, this is not a book to be recommended as light reading for a convalescent friend. It is not light reading, but it is good reading; and it can be understood and read with profit by any thoughtful person who has even a moderate familiarity with the fields mentioned.

Unless you are a scientist, a philosopher, or both, it is not likely to have occurred to you that time needs an arrow to indicate its direction. Past, present, and future we are accustomed to take for granted as an obviously unidirectional sequence. If we are in a mood to disparage someone's intelligence, we are likely to remark, "He doesn't know whether he is coming or going." We are not likely to pause to contemplate that whether we are all coming or going has been one of the serious problems of science and philosophy. And since you still

are probably thinking that the whole matter is pretty silly and that if science and philosophy can't find more important things to worry about, they had better fold up, we shall try to elucidate further.

When showing home movies, one way to get a laugh is — by accident or design — to run the film through the projector in the wrong direction (to avoid a breach of logic, we had better say *in a direction opposite to the usual one*). People and animals walk or run backwards, automobiles speed in reverse, and water flows uphill. Now, the film runs equally well either way; *how do we know which direction is the right one?* To say that the right direction is the one that accords with our normal experience is merely begging the question — we might just as well try to solve a scientific problem by invoking woman's intuition.

Before movies were invented, Lewis Carroll pointed up the problem with a different analogy, that of the mirror image, in which everything is reversed. In *Through the Looking Glass*, Alice had to walk away from anything she wanted to approach. The King's Messenger was punished for what he was about to do; then came the trial, and last of all the crime. The White Queen put a plaster on her finger, screamed awhile, and finally pricked the finger with the pin of her brooch.

"It's a poor sort of memory that only works backwards," the Queen remarked.

"What sort of things do you remember best?" Alice ventured to ask.

"Oh, things that happened the week after next," the Queen replied in a careless tone.

Lewis Carroll (an Oxford mathematician whose real name was Charles Lutwidge Dodgson) thus clearly set forth the problem, but he didn't give the answer, or at best merely hinted at it. If he had known the answer he probably wouldn't have given it, because — like most teachers of mathematics — he was fond of setting up problems and letting other people struggle with them. But as a matter of fact he didn't know the answer, because the science of thermodynamics was at that time (1871) still in its infancy.

More than half a century later Sir Arthur Eddington came back to the problem, presented the solution and dramatized it with the phrase *time's arrow*. It is worth while quoting (in part) Sir Arthur's own words (*New Pathways in Science*, Macmillan, 1934. See also *The Nature of the Physical World*, Macmillan, 1929):

It is said that in a fog an airman sometimes flies upside down without knowing it. Could one similarly become inverted in time . . . ? . . . We do not want to be dependent on consciousness, which is outside the



scope of physics, for so fundamental a physical distinction as that between past and future . . . The signpost depends on a certain measurable quantity called entropy . . .

This brings us back to our last editorial (*Pacific Discovery*, vol. 4, no. 6), in which we undertook to explain entropy in one paragraph. Since we are not optimistic enough to believe that we succeeded, and since there are a number of different ways in which entropy can be explained, we may as well try again.

Entropy is a fundamental concept of the second law of thermodynamics. The first law is the law of conservation of energy—energy can change its form but never its amount. The second law (if my physicist friends will forgive a biologist's irreverence) explains why the first one doesn't work. It is pretty clear that the available energy of the universe is leaking out in various directions from which it can't be got back. Therein lies the fallacy of perpetual motion, which is just as impossible anywhere in the universe as it is in the laboratory. In short, the universe is running down. But since, according to the first law, the total amount of energy remains the same, as the available energy goes down, the unavailable energy has to go up. Entropy is a measure of this unavailable energy. According to the second law, the universe is tending toward a state of maximum entropy. When this state is achieved, there will be just as much energy as ever, but—like the gold in Fort Knox—it won't be doing any work. (We have several other explanations of entropy that we haven't tried yet; if you don't like this one, just turn it in on another model.)

We agree with Sir Arthur that entropy is an arrow that indicates, to the physicist, which way events are moving in time, just as, for the biologist, the irreversibility of organic processes serves the same purpose. (This is what we meant when we said above that Lewis Carroll had "hinted" at the answer. He made it clear, with a bit of gentle spoofing, that memory—which is an organic process—works only in one direction.) The irreversibility of organic processes is, of course, only a part of that larger irreversibility of the order of nature that is implicit in the second law of thermodynamics. That is perhaps the core of Dr. Blum's book.

When we speak of irreversibility as a matter of degree, the logically minded reader is likely to object—a process is either reversible or it isn't. Well, the point is that reversibility, in the sense used here, is a matter of degree. Your automobile is reversible in the sense that you can back it out of the garage or into a parking place, but it is irreversible in the sense that, when you have driven it ten

thousand miles, most of the movement has been in a forward direction. Physical, chemical, and biological processes are like that; they may be partly or temporarily reversible, but in the long run they are going one way. As Dr. Blum phrases it:

"All real processes are irreversible, and when all the changes are taken into account they go with an increase in entropy, that is, toward greater randomness or less order."

It occurs to us at this point that nothing we have said about entropy quite explains how *randomness* comes to be involved. Maybe we have to bring out one of those other explanations that we were holding in reserve, awaiting public demand! Let us compare the universe to a deck of cards (this simile is not original with us; it is probably attributable to G. N. Lewis). When the cards come from the maker, the suits are all arranged in a definite way; the deck has the greatest possible simplicity and order. As you shuffle it, the deck becomes more and more disorderly, until at length the greatest possible randomness is arrived at. Evolution is like this; at the beginning, things are simple and orderly, but as time goes on they get more and more diverse and disorderly. According to the second law of thermodynamics, increasing entropy involves increasing randomness, and maximum entropy means maximum randomness. Here the analogy with a pack of cards breaks down; just as we have the cards completely shuffled and are ready to play, the game is over!

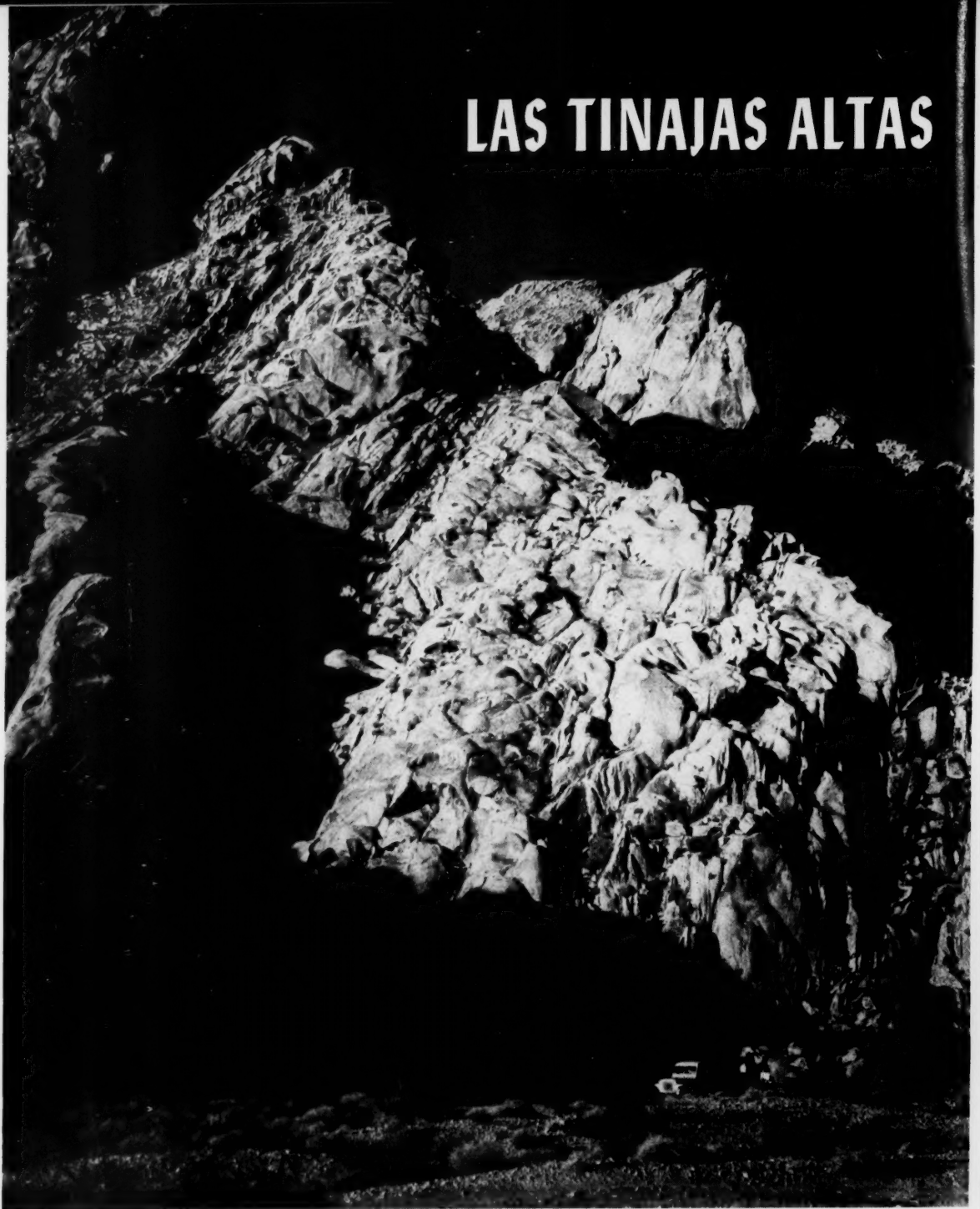
Now, since we have once more used up most of our space explaining what *Time's Arrow and Evolution* is about, let us see if we can summarize Dr. Blum's conclusions:

Evolution is a one-way road. The universe moves always in the direction of greater entropy and randomness, though not always at the same rate. Inorganic evolution—the evolution of the elements, and of stars, planetary systems, and our own earth—must be considered in any study of organic evolution. Inorganic evolution set the stage; it limited, and so to a degree determined, the possible courses that organic evolution might take. All that happens is conditioned by what has happened before. Design in nature is more apparent than real. Inorganic factors are the warp, mutation and natural selection the weft, of evolution.

With some of these conclusions we agree—not all. At least we think we have stated them correctly. If Dr. Blum thinks otherwise, we shall gladly open our columns to his comments. In any event, he has given us a scholarly, informative, and thought-provoking book. If he doesn't have all the answers to all the questions, perhaps it is because some of them are unanswerable.

R. C. M.

# LAS TINAJAS ALTAS



▲ We camped at Tinajas Altas cove on the east side of the Tinajas Altas Mountains in southwestern Arizona, after an hour's drive south over desert road from U. S. Highway 80. Towering above us was the great fault scarp whose elevation made possible the life-giving natural water catchment basins called by early Spanish explorers *Las Tinajas Altas*, the High Tanks.

➤ Weary animals would wait at the often dry first tank on the cove floor, while their riders and drivers climbed to this second tank to bail the water down. If they paused for breath, these water seekers could look out across the Lechuguilla Desert to the Copper Mountains.

## HAROLD O. WEIGHT

HISTORY IS MADE BY MEN, but more often than not, the hand of Nature is tipping the scales that determine man's triumphs and defeats. The grandeur of Egypt vanished when blood flukes weakened its people. A storm scattered the Great Armada and made Spain weak and England great. Placer gold populated California and changed the future of our nation. Drouth ended the growth of a native civilization in the Southwest, and modernly, scattered migrants from the Dust Bowl.

The manner in which simple geology can cancel man's claims to history-making may be less obvious, but it is no less real. For a near-perfect example, we can look to the ancient watering place of *las Tinajas Altas*—the High Tanks—in the granite mountains of southwestern Arizona near the Mexican border. The nine natural tanks of Tinajas Altas are only accidental by-products of great earth-shaping processes of uplift and erosion, yet they set a path of migration and molded the history of the West.

Men no longer stake their lives upon the presence of water in the granite basins of Tinajas Al-

tas. With new roads, new means of transportation, they have abandoned the High Tanks to the wild sheep, coyotes, foxes, bobcats and lesser desert folk. Wild bees still cluster around the pools. Birds turn them into public baths—canyon wrens, yellow warblers, white-crowned sparrows, doves, and mocking birds in exuberant mood from feasting on mistletoe berries in the ironwoods below. Pamilla, *Horsfordia newberryi* and other tenacious desert plants still thrust thirsty roots through the rock joints to tap seeping moisture. But to us, the tanks are a curiosity rather than the answer to survival or extinction.

Today, with comparative ease, you can drive an automobile right to Tinajas Altas cove. Sitting there, on the little mesa which partially blocks the cove mouth, sipping cool liquid from a thermos, you may wonder how the scant water of a few stagnant, scumflecked pools could have been important to history. You are only an hour from a paved transcontinental highway. Along that highway you have accepted casually the facilities of modern American travel—stores, service stations,



cafes, motels. Thirst—real thirst—is inconceivable. When you want water you ask for it—or turn on a tap.

But less than half a century ago a man—or what was left of a man—stumbled down from the very mesa on which you sit, and fell in the sand beneath the ironwoods there. He was bellowing in a hoarse, rasping inhuman voice. That was the summer of 1905, when Professor W J McGee and an Indian helper were camped in the cove. They found the man, a Mexican named Pablo who had been on the desert eight days with two days' water supply. He was naked and his fixed eyes were staring from a burned face. His lips showed only as ridges on blackened tissue. His arms and legs were shrunk and his ribs thrust through the discolored skin.

Pablo survived because he found help at Tinajas Altas. Without help he would have died, as scores before him had, with water almost in sight. Does it seem impossible that a man could be so stricken with heat and thirst that he could not climb a few hundred yards to water which meant life? Your car may be standing upon the obliterated grave of one who knew just that agony. This little flat once was known as the *Mesita de los Muertos*. Forty cross-marked graves could be identified upon it a generation ago.

But those who died at Tinajas Altas were vastly outnumbered by the travelers through more than two centuries whose lives were preserved by its

waters. Few in that multitude drawing life itself from the *tinajas* wondered why these pools stood in an arid land without permanent streams, springs or dependable rainfall. They were there, thank God, and that was enough.

We have more time and peace of mind to ponder the problem, but few modern visitors do. Why should natural granite tanks like those of Tinajas Altas be found in some of the mountains of Papagueria and not in other apparently similar ranges? Why are they located in the eastern face of the Tinajas Altas mountains and not in the western? Why did so many—nine major tanks—form in this one canyon?

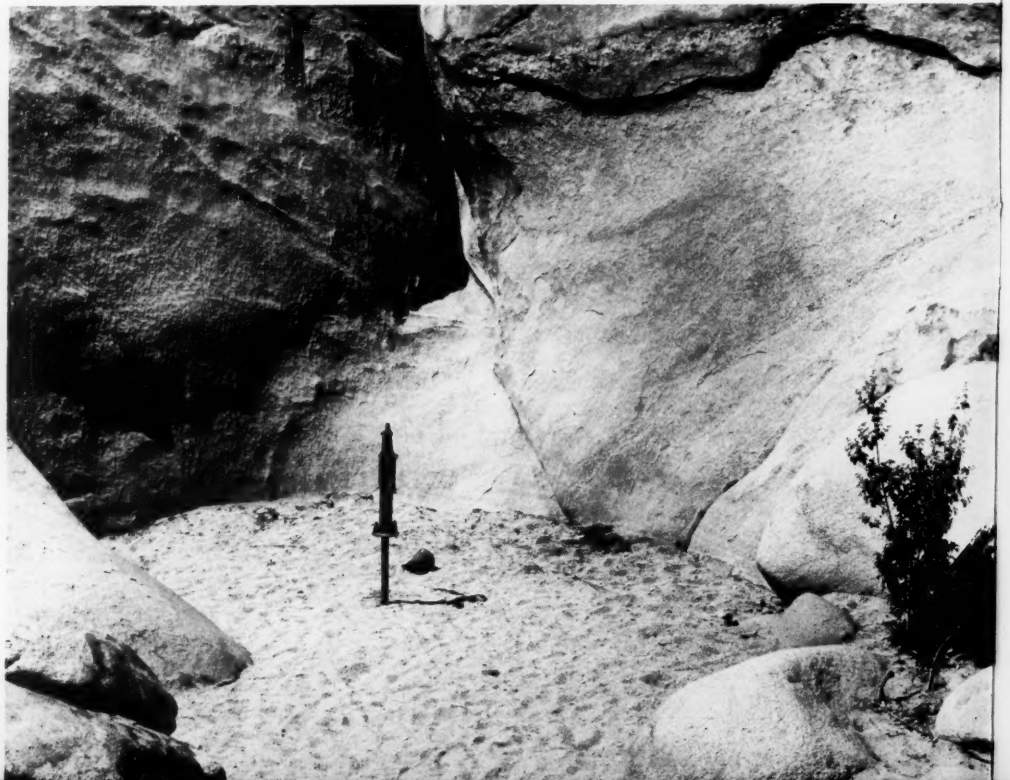
According to Kirk Bryan, who studied the water supply of Papago-land for the U. S. Geological Survey, many of southwestern Arizona's mountains were formed when narrow strips of the earth's crust, which lay between faults, were thrust upward by vast stresses in the underlying rock. In the ages that followed this uplift, normal erosion cut streambeds from the valleys to the new mountain crests.

After the streambeds were eroded, renewed uplift elevated one or both sides of some of the ranges along the fault lines. Such a movement, believed to have occurred in Pleistocene times, forced the eastern front of the Tinajas Altas mountains hundreds of feet upward, forming a great fault scarp.

As the eastern face of the mountains rose, the

The lowest and largest of the nine tanks at Tinajas Altas was frequently exhausted because it was the easiest to reach.

High water marks are visible on the rock wall just above the sand. A visitor in the nineties told of finding here the bodies of three prospectors who died trying to climb to the water in the second tank above.





**PHOTOGRAPHS BY THE AUTHOR**

From the top of the falls at the edge of Alta Valley, standing beside tank nine, one can look down on eight, six, and five. Seven is behind the granite shoulder which the intermittent stream has grooved deeply along a major joint.



The third tank of Tinajas Altas is unique in the way falling boulders have wedged and formed a cave-like recess for it. Since it is little exposed to the sun and has a gravel bottom, there is less evaporation from it than from the others.





From Alta Valley, above the upper tanks, one looks east-southeast at the Cabeza Prieta range. The dark horizontal streak in the middle distance is Coyote Wash, where Anza and Garcés camped in 1774 on the first overland expedition to California. The road is the Camino del Diablo.

grade of the streams flowing toward the east lessened as their beds were tilted back. Where the fault scarp cut the streambed, a vertical fall was created. When the next rains fell, the intermittent streams commenced cutting a new grade back through the fault scarp to the mountain crest. That natural engineering project is still in progress.

At the cove, the fault-scarp falls have an extremely rapid drop of 500 feet. Along that drop are found the water-storing tanks which have made Tinajas Altas famous. The exact positions of those tanks or plunge pools are determined by the manner in which the massive granite of the mountains was cracked into two systems of fractures or joints during repeated earth vibrations.

The master system, dipping into the earth at an angle of 65 degrees, divides the granite into slabs two to ten feet thick. The secondary system cuts the master not quite at right angles, and dips almost vertically.

The joints determine, roughly, how granite will weather, since surface water penetrates them and breaks segments loose either by chemical reaction or expansion and contraction due to temperature variation. In this way the joints set the course of the falls at Tinajas Altas. When storm-created runoffs pour over the scarp, their steeper grades follow the almost vertical dip of the secondary joint system; their more gradual runs follow the 65-degree dip of the master joints. And the plung-

ing waters and the debris they carry have attacked the weaker points—where the master joints are closest together and are intersected by secondary joints—to gouge out the tanks of Tinajas Altas.

From the very beginning in that dry land, a water supply like the High Tanks would have gathered a community of plant and animal life around it. The desert Indians were quick to recognize the cove's advantages. The fracturing granite rocks did more than expedite formation of natural tanks. As they tilted back, slipped, or fell away from the cliffs and piled up at the mountain bases, they formed caves where the Indians could shelter themselves from heat and cold. They became forts for defense, blinds beside the granite tanks where game coming to drink could be slain, smooth roofs for pictograph art galleries.

In the cove were mesquites, ironwoods, and palo verdes, and the beans and pods which they produced could be milled with granite mortars and pestles. Wild sheep and antelope drank at the tanks. Rabbits and lizards and snakes could be caught. The isolation of the cove made attack unlikely, and its water made the dwellers there master of the trails through that part of the desert.

The Areneños, called Sand Papagos, maintained one of their chief villages at Tinajas Altas. You will find their deep grinding holes and shallow hollows everywhere. One small cave shelter has 42 of the holes and hollows in its floor. Bits of broken pottery are widely scattered. Since authorities have placed the total tribal membership of the Sand Papagos at no more than 150 they must have lived at Tinajas Altas a long time to leave such evidence.

These first citizens observed the unusual geology of their water supply and explained it to their own satisfaction. In the times before the Old Ones could remember, two hero gods shot arrows from opposite sides of these mountains. One shot his arrow all the way across. There are no tanks on the western side. But the other was short of his mark and where his arrow fell, the pools appeared magically in the sheer rock wall. So they called the village *Oövak*—"Where the arrows were shot."

The Sand Papagos had learned to survive handily in the inhospitable desert. Their meat diet consisted of almost anything they could catch, kill or find, dead or alive. Their favorite vegetables were *Ammobroma sonora*, the sand plant dug from the dunes, and the fruit of the organ pipe

cactus and saguaro. They went to the Gulf of California for fish and sea lions. Sandals were made from sea lion skins, leather breech-cloths and shirts from hides of mountain sheep and antelope. Badger hair was woven into ribbons and twine.

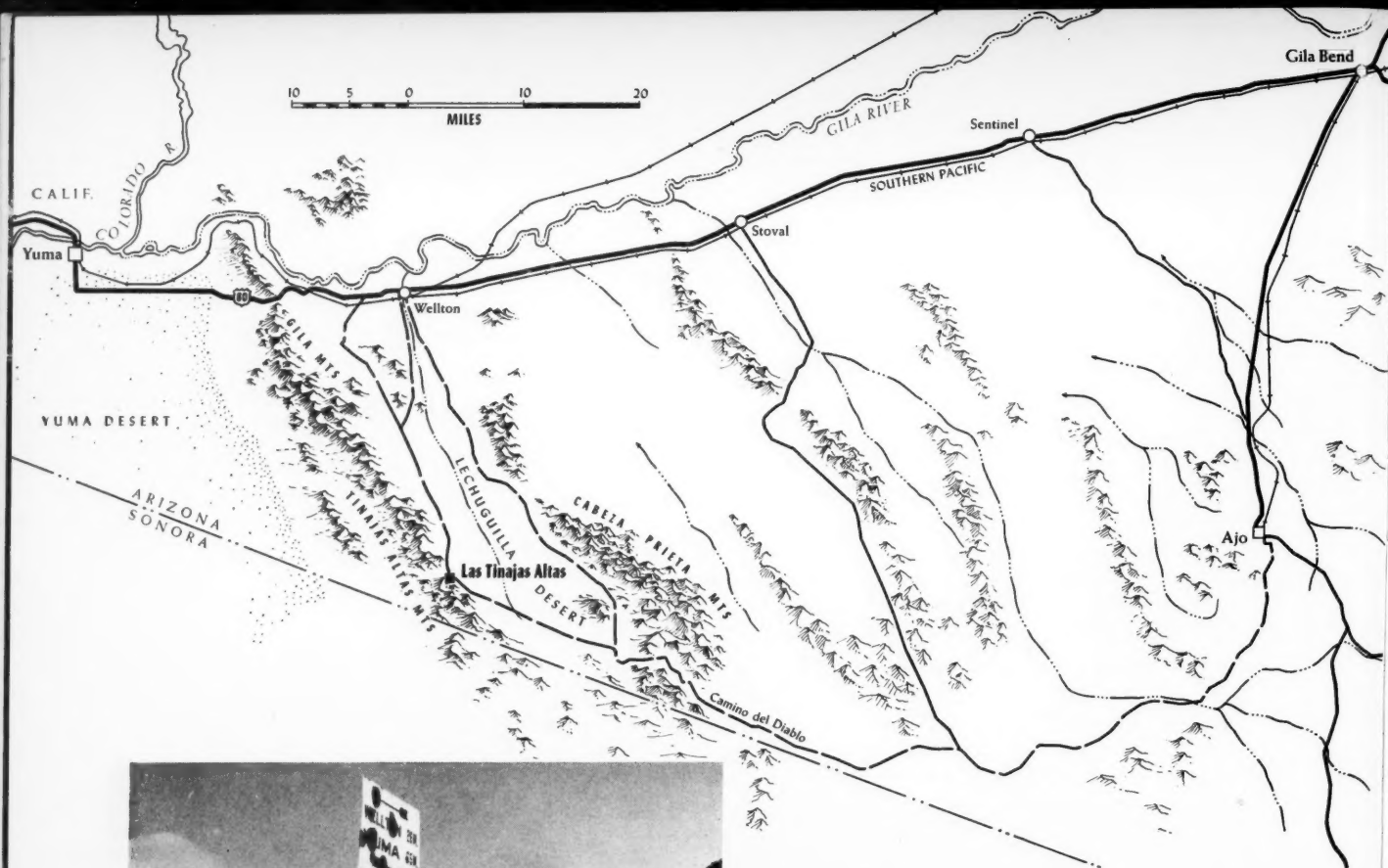
Probably they thought they were well off. But when Juan Mateo Mange came into the cove of Tinajas Altas in February 1699, he described them as "thirty naked and poverty-stricken Indians who lived solely on roots, lizards and other wild food." But when a Spaniard of that period called Indians poverty-stricken, perhaps he meant they had nothing worth taking away from them. Mange was commanding the escort of that great missionary-explorer of the Southwest, Jesuit Fr. Eusebio Francisco Kino.

Kino called the watering place *Agua Escondido*, because the tanks were hidden among the rocks. He visited it several times as he trailblazed the unknown desert, preaching, baptizing, inquiring, probing, mapping. The Jesuits were expelled from the Spanish Southwest by Charles III in 1767. In the blazing summer of 1771, the gray-robed Franciscan Padre Francisco Garcés, worthy successor to long-dead Kino, paused briefly at Tinajas Altas and identified them as the *Tinajas de Eusebio*. While Kino traveled with horses, servants, and escorts, Padre Garcés went thousands of miles afoot and often alone or with only Indian guides, among warlike tribes which had never before seen a white man.

Garcés was killed, with fellow priests and colonists, by the Yuma Indians of the Colorado River, in 1781. In the report of the expedition of Lieutenant-Colonel Pedro Fages to punish the Yumas, we find the last Spanish reference to Tinajas Altas and the first written application of that name to the tanks. When he passed Tinajas Altas for Sonoita, in October 1781, with 64 men, women, and children he had ransomed from the Yumas, he com-

When Kirk Bryan of the U. S. Geological Survey found this inscription 32 years ago in a niche on the north wall of Tinajas Altas cove, it was clear: "Josefa Jacoba Martin, Abril 16, 1874." The fact that her name stands alone would indicate this was a memorial—that here in 1874 Josefa died.





▲ This map is compiled from various sources, and its accuracy cannot be guaranteed. Always make local inquiry before attempting any secondary desert roads, and be sure you are properly supplied and equipped. The author says that the road between Las Tinajas Altas and Ajo has bad places where an ordinary car might get into trouble—he recommends a jeep if you want to try it.

◀ The Geological Survey put this sign at the mouth of Tinajas Altas cove nearly 30 years ago, when Kirk Bryan was surveying the water supply of Papago-land and the tanks were still vital to desert travelers.

plained: "They call this a watering place, but you must go on all fours to reach it."

The real importance of the High Tanks in history came with the California gold discovery in 1848. Then a great rag-tag migration of fortune seekers crawled through the merciless deserts of southern Arizona. Most were Mexican miners and their families from Sonora and other Mexican states. Some were Americans from the East and South who took this route to avoid the Apaches. So many of them died en route that their sandy trail got and still retains the name *Camino del Diablo*, the Devil's Highway. Without Tinajas

Altas, this road would never have been passable.

As large parties camped in the cove day after day, the capacity of the tanks was taxed; sometimes they were emptied. Surrounding desert trees were cut for firewood. Game which escaped fled to distant canyons. The flood tide passed, and so did the backwash of returning adventurers. The cove was almost deserted until the 1860's when renewed surges and more graves followed the discovery of rich gold nuggets on the Gila and Colorado rivers. With the construction of the Southern Pacific railroad through Arizona, the High Tanks became unimportant, visited only by prospectors, wandering Indians, government expeditions, adventurous travelers.

Now they are on the way to becoming a tourist attraction. It is commendable that Americans are willing to brave a rough road to see historic spots. But too many visitors seem content to sit in their comfortable car on the mesa, eat lunch under the ironwoods and drive back to Highway 80 wondering why there is so much fuss about a little desert canyon.

Let's leave our sleek modern car, our thermos of cool water, our carbonated drinks in the picnic refrigerator, and walk to the bullet-riddled Geological Survey sign which stands not far from the spot where Professor McGee found thirst-maddened Pablo 46 years ago. According to that sign, which has saved more than one life since Kirk Bryan put it there 30 years ago, the lowest tank is 900 feet up the sandy wash. It is hot in the sun, and perhaps that seems quite a distance to walk over rough terrain. But dying men—and women—have crawled every foot of that wash.

The lowest tank, half ground into the base of the cliff, is the largest of them all. A hand pump is sunk into the gravel that half fills it. In gold rush days men dug to the water with their bare hands—if water was there. Since it was the most easily accessible, it was soonest exhausted. Looking at the granite wall of the tank, you see the marks of old levels where the water stood after good rains. But you cannot see the bloody marks once made by the torn hands of thirst-crazed men who tried to climb to the second tank and, failing, died in the parched gravel. The water was scarcely a hundred feet above them, but it might as well have been on another planet.

To reach that second tank, you must follow a circuitous route up a steep talus slope to the left and along a joint in the massive granite. It looks

dangerous, and could be to an exhausted person. Then there is a difficult climb down to the edge of this second tank which, during low water at least, is divided into two basins. But 170 years ago, Spanish soldiers not only reached the tank but carried water from it to thirsty animals in the cove.

This second tank is a good one at which to see how the scouring water has cut the storage pools downward between the joints of the major rock fractures. The third tank, unique in that it is hidden in a cave made by wedged fallen boulders, can be reached by working up the smooth granite pathway of the falls.

But if we would see the upper six tanks, we must go back to the cove, then climb a narrow, talus-choked canyon to the right of the falls, cross a divide, and follow a precarious trail down into Alta Valley. Here we come out at the top tank and are able to look down upon the others. But ropes would be necessary to obtain water from them. Even wild sheep seeking to drink from them have been known to fall and die.

It is a rough, tiring climb to Alta Valley. But there is a story that in 1855—when her three male companions had resigned themselves to death between Yuma and Tinajas Altas—a Mexican woman walked to the cove, climbed to the highest tank, filled her empty leathern *bota* with water, and returned to save her men. For the present-day visitor not suffering from thirst, there is a truly magnificent view across the Lechuguilla Desert.

And the theory that renewed uplift created the High Tanks receives confirmation in Alta Valley. The stream bed there is almost level to the very top of the falls. Then, with a few shallow drops it plunges down the face of the steep scarp. Looking down, we can trace out the fractures of the two joint systems and see how they guided the course of the falls.

If you have gone without water all the time, you will be thirsty when you reach your car again. But I doubt you will be thirsty enough to drink Tinajas Altas' dead, often fouled water. You will be honestly tired. But you will have gained a deeper understanding of the vast slow processes which have made this world habitable. And perhaps the next time some vainglorious human boasts of the history man has made, you will remember a spot in southern Arizona where the only history man made was that which geology permitted him to make.

END



# CALIFORNIA'S Bishop PINES

John Thomas Howell WITH PHOTOGRAPHS BY M. Woodbridge Williams

IN ALL THE WORLD THERE IS NO REGION of equal size that can compare with California in the number of kinds of native conifers or cone-bearers. These interesting and remarkable trees are found in nearly every part of the state where trees grow—from ocean bluffs and maritime dune hills to timber line in the higher mountains, and from jungle-like rain forest of humid coastal slopes to sparse open groves of rocky desert ranges. Few regions in the world can offer so many diverse habitats in so short a space; and in no other region have the conifers become so diversified.

What is true of California's conifers in general is true of its pines in particular. There are perhaps 90 species of pines in the world, and of this number 18 or 20 are native to California, one species out of four or five — no other region in the world can equal this imposing figure. What an array of forms and structures they present! — giant pines, bush pines, dwarf pines; needles solitary or nee-

dles bundled in 2's, 3's, 4's, and 5's; very small cones, and the largest and heaviest of all pine cones; cones that open and shed their seed normally, and cones that remain closed for years or open only after exposure to the heat of a forest fire.

The "closed-cone pines" form the most distinctive and restricted group of California species, the knobcone pine (*Pinus attenuata*), the Monterey pine (*P. radiata*), and the bishop pine (*P. muricata*). The first, which is characteristic of open or bushy slopes toward the interior, extends northward to southern Oregon; the last two, which are restricted to coastal slopes, are found southward to the islands off Baja California and to one highly isolated station on the peninsula mainland. Thus, while these trees are not restricted to the political bounds of the state, they are essentially Californian in that they belong to the California floristic province and are nearly coextensive with it.

The bishop pine is perhaps the most picturesque





Bishop pines seldom assume identical shapes. The group in the center belongs to an old close-packed stand. The tree to the right has had more room to spread in oak-fashion. These trees overlook Tomales Bay in Marin County.



of the three closed-cone pines, and wherever it grows it adds to the interest and beauty of the scene. It has its best and most luxuriant development along the northern California coast where it is well watered by winter rains and never becomes over-dry because of summer fogs. Far to the south where rainfall is scant and summer fogs less prevalent, the trees are more slender and the foliage sparser, or under particularly unfavorable conditions, mature trees may attain only the size of shrubs.

On Point Reyes Peninsula, just north of San Francisco and the Golden Gate, where all of the accompanying photographs of bishop pine were taken, one can find about all the habit variations this variable species may exhibit in its wide range from northern California to middle Baja California. There in Marin County, on Inverness Ridge, the trees grow tall and straight if they are in close, dense stands, or they are broadly branched if they grow in open places apart from their neighbors. The slopes on which they grow are well supplied with rain and fog, so most of the trees are well developed. There are, however, some steep declivities and rocky hogback spurs where the soil is very

thin and poor and where conditions are generally unfavorable for full growth. In such places the trees are dwarfed to the size of shrubs and are mature and cone-bearing when only four to six feet tall. It is not easy to believe that a tree species can be so variable, but this is only one of several such instances of dwarfing among the cone-bearers of California.

The relatively restricted and isolated forest of bishop pine on Inverness Ridge is typical of the way in which the tree occurs throughout most of its range (and is typical also of the occurrence of several other conifers found along the California coast). It is true that northward in Sonoma and Humboldt counties the tree is more common and widespread, but from Marin County southward it is found only at definitely circumscribed stations that are quite isolated. Aside from a few individuals scattered in the rugged hill country between Point Reyes Peninsula and Mount Tamalpais, the next known occurrence to the south is on Monterey Peninsula, and thence southward at localities in San Luis Obispo and Santa Barbara counties, on Santa Cruz and Santa Rosa islands off Santa Barbara, in Baja California near San Quin-

A "botanical island"—this is a pure stand of bishop pine on Inverness Ridge. These trees are descendants of a Pleistocene forest that may have existed when this ridge was an actual island. Tomales Bay, in the background, lies in the trough of the San Andreas Fault. Geology, flora, and fauna of the opposite shore are quite different.



tin, and on Cedros Island off the middle coast of the peninsula.

This highly interrupted distribution pattern is owing in part to the geological history of the region during and after the Pleistocene, and in part to the present-day soil and climatic conditions which seem to be the contemporary factors restricting the spread of the species. The influence of geologic history on the Inverness Ridge occurrence of bishop pine is clearly apparent. Here the forest is nearly if not quite restricted to the area of granitic rocks and to the soils derived from the disintegration of granite. The outcropping of this granite in Marin County results from major earth movements along the San Andreas Fault, one of the great rift zones of the world. In Marin County,

not only is the bishop pine nearly restricted to the region west of the fault, but the redwood, *Sequoia sempervirens*, which is common to the east of the fault, has not crossed it and is unknown on Point Reyes Peninsula.

Already a small part of this outstanding natural area on Point Reyes Peninsula, so scenic and yet so important scientifically, has been set aside as a California state park. It is good to know that the reservation is now being enlarged through the efforts of the Marin Conservation League and that a portion of the area will be dedicated, very appropriately, to the memory of California's great botanist, Willis Linn Jepson, one of the foremost students of the bishop pine and other California trees.

END

## How the Bishop Pine was Named

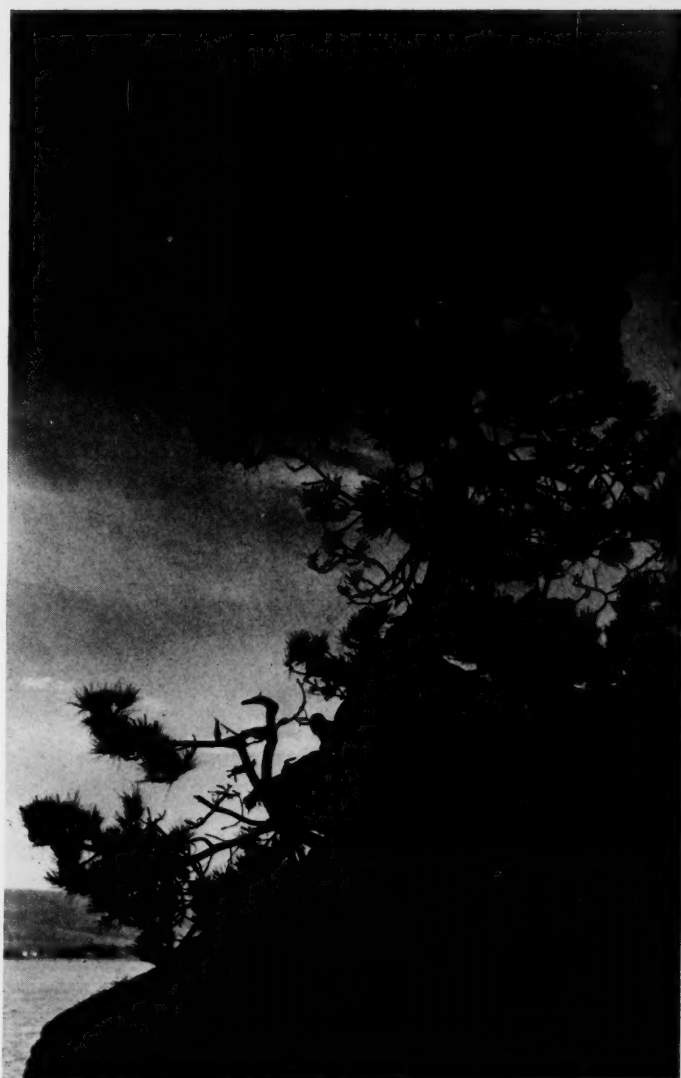
A 13TH CENTURY SAINT is the bishop of the bishop pine. The tree was not named directly after St. Louis, Bishop of Toulouse, however, but after the California mission bearing his name, San Luis Obispo.\* It was near the mission, undoubtedly in the Santa Lucia Range, that the Irish botanist, Thomas Coulter, discovered the pine. Dr. Coulter found another new pine, as well, when he crossed that range on a journey from Monterey to the lower Colorado River between 1831 and 1833† — his memory is honored in science in the name of the Coulter pine (*Pinus coulteri* is the one with the world's heaviest cones) and 56 other plants.

One of the many British botanists who have named, or had their names given to American plants, described the bishop pine scientifically: an Englishman, David Don, termed it *muricata* from the short, sharp spines on the knobby cones (Latin, *murex*, a pointed rock or stone).

After his return to the green isle from semi-arid southern California, Thomas Coulter was appointed curator of the herbarium at Trinity College, Dublin, where his collection of American plants is preserved and where, even now, interested students may examine those original twigs of the bishop pine, collected more than a century ago in far-off and little known Alta California.—EDITOR.

\*Mission San Luis Rey in San Diego County was named for another St. Louis, King of France, uncle of the sainted bishop.

†See *Notes on Upper California, 1832*, by Dr. Thomas Coulter. Early California Travels Series, vol. I, Glen Dawson: Los Angeles, 1951 (reviewed in this issue).



▲ and opposite page—The bishop pine adapts itself to the extremes of environment in its habitat range. It will luxuriate in rich grassland, grow tall with long, sweeping branches. But on a rocky, windbeaten ridge with scant soil it becomes a stunted dwarf, resembling the aged little trees so carefully cultivated by the Japanese.

◀ Young staminate cones are growing at the tip of this branchlet, with the young pistillate cones close around the twig below, their sharp spines well developed.

➤ turn the page—The bishop pine is a fogbelt tree. This is a summer panorama of the Point Reyes Peninsula jutting out into the Pacific from Marin County. The fog is humped high over the rocky headland of the Point itself, while a lone bishop pine guards Inverness Ridge.







ROXANA S. FERRIS

# Collecting on Si-shan

Photographs by the Author



ACROSS THE SHALLOWS OF THE LAKE at Kunming, the capital of Yunnan Province in China, lie the Western Hills. Scenically they deserve to be called something more than hills, for they rise mountain-like from the shores of the lake with but a narrow strip of flat land between their feet and the water. On this flat are little villages, cotton mills, summer homes, and even a few rice paddies. The shrub-covered bluffs and forested canyons rise to a summit fifteen hundred feet or more above the level of the lake. From the plain at its upper edge, where Kunming is situated, the eye-inviting sweep over the lake to the highest summit of Si-shan is a view worth remembering, a satisfying landmark that always comes to mind when I think of my brief but pleasant stay in that part of interior China.

In the early spring of 1949 I joined my husband who was then at Canton for the purpose of collecting scale insects from the vegetation of China. Yunnan Province was, from his point of view, entirely unexplored territory and Kunming was readily reachable by plane for transients such as we. So we flew to Kunming. When one seeks scale insects it is necessary to find native vegetation in order to make the search worth while. True, it is interesting from the point of view of a collector to find things on the cultivated trees and shrubs in city gardens — for it is these species on cultivated hosts that make the scale insects economically important — but it is finding the species on wild vegetation that extends our knowledge of the geographical distribution of the group, and it is this in which my husband is especially interested. A knowledge of the scale insects occurring

naturally in any area is only to be gained laboriously by examining the leaves of native trees and shrubs, by peering into the crevices of their trunks, by tearing the perennial grasses apart, or by pulling up the smaller shrubs to see what may be on their roots. Then, with a hand lens, it is necessary to look closely to see whether that speck is an insect or is merely a bit of fungus or a piece of dirt.

To find areas where the native scrub or forests



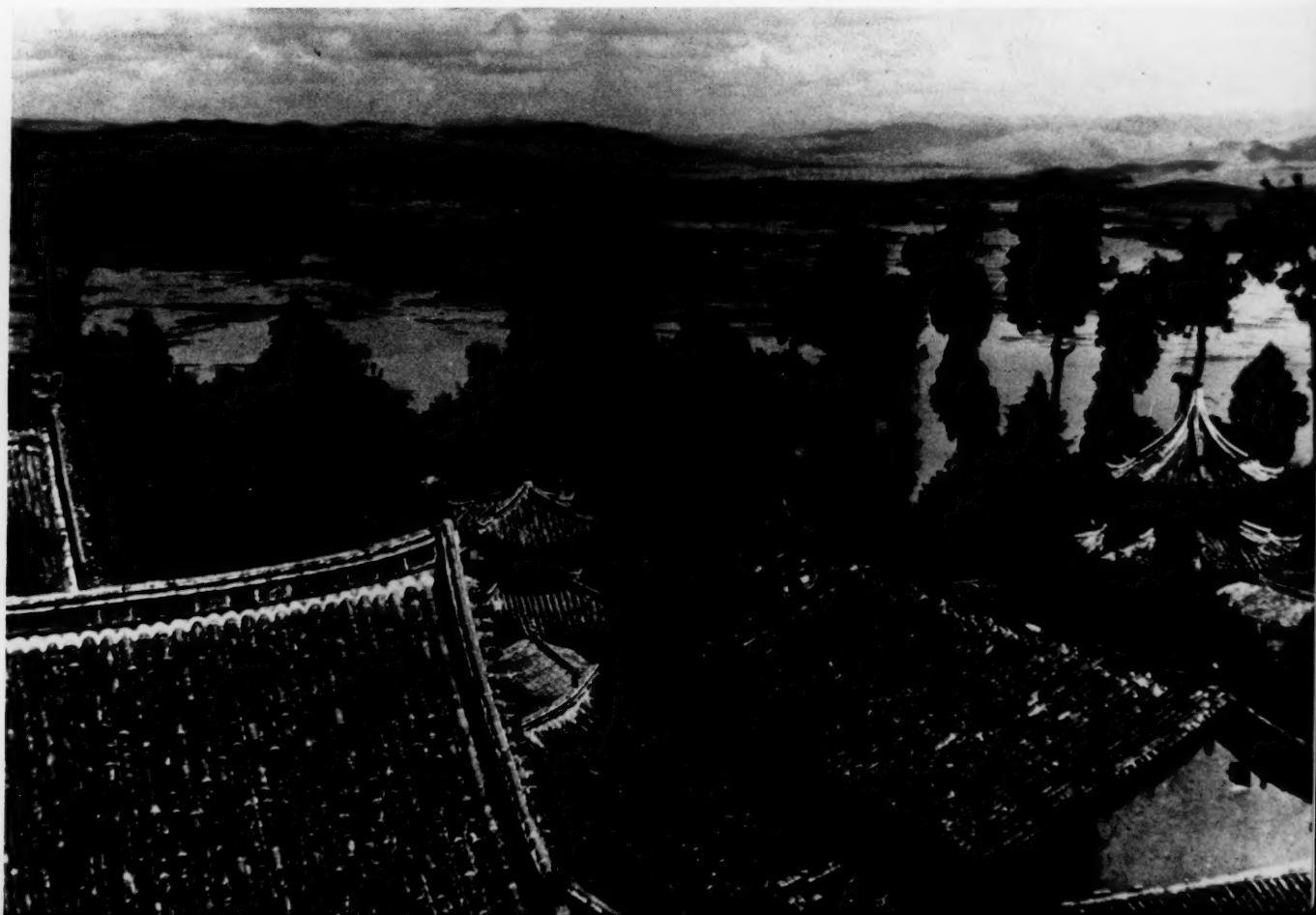
▲ Professors Yun-chun Hsu and G. F. Ferris, of Yunnan National University and Stanford University, respectively, looking for scale insects in China's Yunnan Province.

➤ Kunming, the provincial capital, lay across the shallows of the lake from the middle temple at Si-shan, where we stayed.

Entrance to the lower temple.

are left in any of the more readily accessible parts of China is not the simple problem that it is in the United States. It is not merely a question of finding land that is not devoted to food crops, important as that may be. For many hundreds of years fuel has been needed in China for cooking the daily rice, and timber has been needed for houses. At the edge of the lake, just outside of Kunming, sampans — rowed, poled or, if there is a breeze, moved by the wind in their square sails — come in to discharge their loads which have been gathered from all around the shores of the lake and perhaps even from miles back from the shores. At the landing were great piles of wood, pine cones, dried grass and ferns used for fuel, along with building stones and food materials. The hunt for fuel has led to the stripping of the woody vegetation from land far beyond the agricultural areas. It is fortunate for entomologists, or for anyone else who may be interested in the native vegetation, that around the temples, both Buddhist and Taoist, the native flora is preserved. The trees may be stripped of their branches far up from the ground and all fallen branches and twigs are picked up but the trees themselves are not cut. On the slopes of Si-shan there are three groups of

temples, spaced a few kilometers apart, and consequently the native forest remains more or less intact — a remnant of things as they were in times past when all the surrounding mountains may very well have been forested to their tops. These areas about the temples form a marked contrast to the beautiful but barren hills surrounding Kunming, their barrenness relieved only by the little village groves and by the trees planted in the city.





Detail of entrance to the principal shrine at the lower temple.

In passing it may be remarked that among the planted trees eucalyptus — from Australia — is one of the most frequent.

Kunming is something of a jumping-off place for the country on beyond to the borders of Burma on one side and of Tibet on another. But this was no time for private expeditions. Trucking on the Burma Road had practically stopped in late April because of banditry — banditry in both the dictionary sense of the word and under the disguise of revolutionary activity. The busses no longer ran to Tali, a place that from all accounts would be wonderful for collecting. The railroad to Indo-China functioned for only a short distance and travel along it was at the risk of banditry. Nor was there any longer plane service to Li Chiang, the gateway to Tibet. So we were forced to stay close to the neighborhood of Kunming and ar-

rangements were made to live for a time at one of the temples at Si-shan.

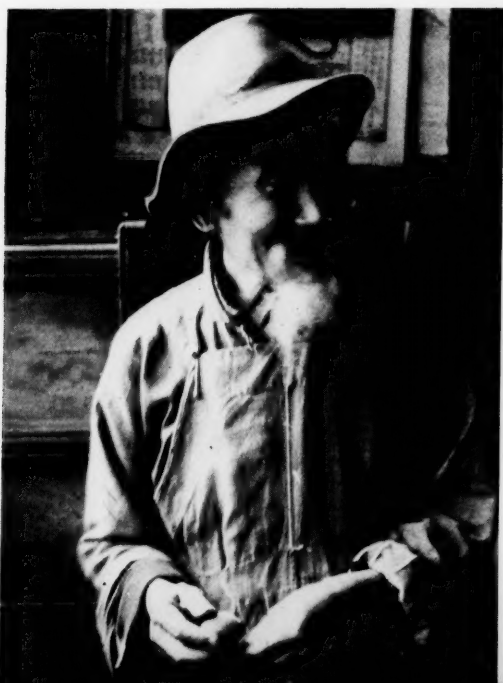
It is the custom for temples and monasteries to shelter travelers and to receive guests. Often a separate guest house is provided for such persons and is set somewhat apart from sections of the temple devoted to ritual functions. Permission to stay for any period is readily granted and is in fact one of the sources of revenue for the temples. Theoretically no charge is made, except for food, but one is expected to make a gift upon departing. In fact, the temple at the foot of the hill at Si-shan seemed to us to be something of a resort hotel, a place where one might go with the family for lunch or dinner or even to stay overnight. The guest house seemed to be filled. This temple is evidently one of the favorite sights of Kunming and it is indeed well worth seeing — from the large lily pond in front of the entrance with its brightly painted and fearsome guardian figures to its colorful main shrine room. Not only were the banners and draperies and the incense burners of high quality but the walls of the principal shrine room were covered on three sides with a brightly painted over-all design of figures in high relief. Most of these figures are grotesques of religious significance, but we found no one to tell us what they mean. Hordes of school children — more than 200 at a time — would come for their holiday and could be found wandering about or lining up with their rice bowls to be fed since the temple seems to maintain a restaurant service of a sort. They explore about with the determination of seasoned tourists. Singing and shouting as they went, they visited all the temples of Si-shan, from the lowest at the foot of the slope to the highest, far up on the cliffs. While we were staying at the middle temple, which we had chosen for our monastic life because of its promise of more peace and quiet, we had a visitation of them and I could only think of a flight of cedar waxwings, for suddenly they were everywhere with their chatter and just as suddenly they were away in a body.

It was our good fortune to have with us Professor Yun-chun Hsu, of the Department of Forestry of Yunnan National University, and it was from him that I gleaned such facts as I could about the temples. The highest temple — the one highest on the cliffs — is the oldest. The middle temple where we stayed is next oldest, having been founded perhaps 500 years ago, and the lowest temple is the youngest and the most prosperous — also ap-

parently the most commercialized. The three temple groups are connected by a good dirt road, of which the last half mile or so to the highest temple is little more than a jeep track cut out of the hillside. From its end one goes up a flight of 76 stone steps to the entrance gate, through the gate, and then up more flights of stone steps which wind about to suit the contours of the hill, passing small temples and little grottoes cut out of the cliff face and coming finally to the last grotto by way of a trail that is cut out of the solid rock and in places passing through short tunnels or half tunnels. Each grotto contains a shrine with one or more brightly painted figures. Before coming to the last grotto one passes through the narrow Dragon Gate and from the platform cut out of the rock before the shrine one can look down to the lake directly under one's feet and far below.

At the time of our visit the third temple was glistening with new paint and gilding. The story was that a recent gift had made this possible and everything had but recently been brightened up, while some of the buildings were still in the course of repair.

Our temporary home at the second temple had apparently not shared extensively in any such gifts, although even here some repair work was under way. The two temple buildings housing the principal shrines had been newly refurbished and many of the exquisite little paintings of birds and deer and flowers on door panels and other similar surfaces had been freshly done by someone of genuine skill. Even so, the whole place had a generally seedy look, from living quarters to gardens. Our abbot and his little group of seven



monks seemed to have ambitions for the establishment. Workmen were putting new beams and tile roof on the entrance portico and were laying stone conduit to bring water from a little spring to the gardens. If the rhododendrons and camellias and peonies could bloom again and the ancient apricot tree with a trunk about two feet in thickness could live another fifty years their efforts would not be in vain.

We soon settled into the routine of temple life, scarcely even noticing the *bong* of the temple bells about four o'clock in the morning. We occupied the second floor of the detached guest house, and the veranda which encircled it gave a soul-

Two of the monks, above,  
and our cook, left, at the  
middle temple.



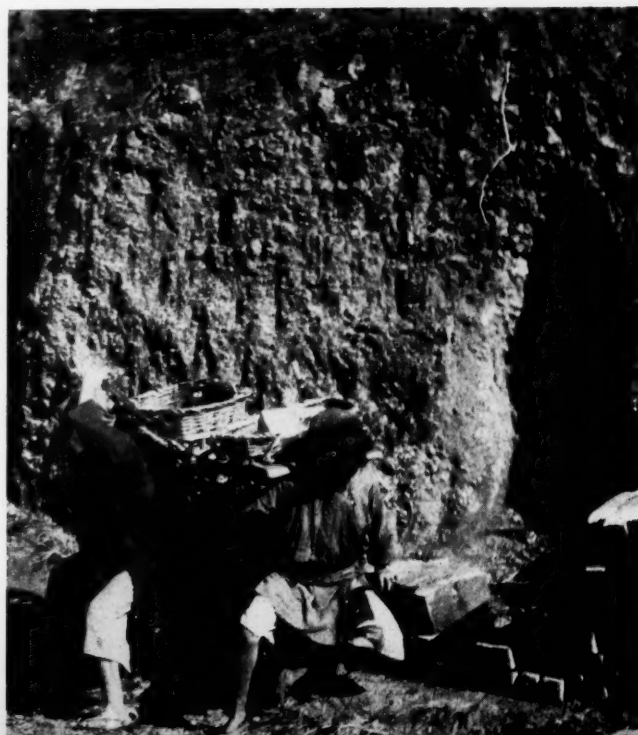


Human muscle is the power of China. It made my own back ache to see the basketsful of building stone the "tribal people" — stocky and strong as they were — carried on their backs up steep trails with the aid of a tumpline about the forehead.

satisfying view down to the lake perhaps 750 feet below on one side and the back-drop of forest on the other. But the body's requirements were not so well satisfied. Our room contained two pairs of trestles with a few boards laid across them to serve as beds, three or four bamboo stools and a couple of little makeshift tables. The windows of wooden grill work covered with paper — with many breaks and gaps — gave us daylight and a heavy bar across the door prevented intrusion at night. We furnished our own candles. Apparently many people had stayed here in the past, judging from inscriptions scribbled on the walls. One was in English — "Ten Nan Middle School travel here stay three nights." These inscriptions seemed to be the customary thing — like leaving names in a cairn on a mountain top — so we added our own over which probably many Chinese will in future puzzle: "not recommended by Duncan Hines."

After the evening meal there was nothing to do but sit on the veranda and watch the changing panorama on the lake below, with its long lines of passing boats bound to and from Kunming, until dusk brought out the twinkling lights of the city across the head of the lake. Then by candlelight we went to bed to keep warm, for it can be quite chilly at this altitude of nearly 7,000 feet on Sishan. We envied the workmen in their quarters across the court from us for they could build a fire on the stone floor of their room.

One evening the full moon rose over the lake and its beauty inspired the workmen to sing for an hour or so to the accompaniment of a one-







"The changing panorama on the lake below. . ."

string fiddle. Even the white-collared crows that nested under the roof of the guest house thought it light enough for foraging trips but made a fearful to-do when they tried to find their way home to their nests in the dark shadows under the eaves. Their desperate and repeatedly defeated struggles to find their entrance resembled for all the world the efforts of a drunk to find the keyhole and left us laughing in our beds below, although finally we began to hope for their success so we could go to sleep. But I found the place an eerie one to stay in on a night of storm when the doors creaked on their wooden hinges, the rain came down in sheets, and the wind made mouse-like noises through the torn paper of the window grills.

I tried to read myself to sleep by flickering candlelight with a copy of M. R. James' *Tales of an Antiquary*. That text, with the accompanying sound effects, was too realistic for me. After all I was in a medieval monastery, an Oriental one at that, and James' nameless, creeping horrors seemed all too plausible!

The days were exhilarating, sunny and just warm enough, and the collecting for scale insects and plants was good. There were trails everywhere through the woods. One day it would be up to the apparently abandoned weather station at the top of Si-shan, up through the pines and the oaks where a few of the large, white rhododendrons were still in bloom. Another day down the

ancient, stone-paved, and now abandoned path where Marco Polo himself had perhaps trod in his inspection tour of the Province, through the bamboos and castanopsis and cypress to the shore of the lake. Yet another day to the limestone quarry on the highest slope where the Yunnan redbud grew and anemones and big blue salvias were in bloom. I found myself in a state of continual botanical excitement. It was good to be in a temperate zone where I could recognize most of the genera of plants, with Professor Hsu at hand to identify those that I did not know. I tried to convey to him my pleasure at finding Wilson's barberry and a cotoneaster I had growing in my garden at home, and I remarked that I would like to be able to write a poem in Chinese about it. The next day he translated for me a poem he had written on forest conservation, a theme very dear to his heart.

The mountain air and the hiking gave us a fine appetite, which was just as well for the cooking at the middle temple was not up to the usual Chinese standard which to me has the most subtle blending of flavors of any I know. On one occasion Professor Hsu, picking the bad grains and the husks from his bowl of rice, remarked that it was the worst cooking he had ever tasted. I can vouch that the breakfast noodles, gray and tasting reminiscently of rats and mold, were more than I could take. The cheerful old cook, however, did the best he could. Before we left he was providing fried potato chips and fried peanuts, as well as other tasty dishes, for breakfast. Where his imagination — or perhaps the markets at the foot of the mountain — failed dismally was in providing food for meat-eaters like ourselves. After all, he was indoctrinated to cook for a Buddhist temple, which is vegetarian, but we rather objected to his using the silver which we gave him merely to purchase 90 eggs. Every day, three times a day, three eggs for each of us was served up fried stiff and hard in oil. We were glad that we had brought along some tins of Yunnan ham.

Our meals were served to us on the veranda of the monks' dining room. It was a pleasant place overlooking the garden and the temple where the services were held. The temple help would drift out from the adjacent kitchen to enjoy the sun and have a bit of gossip and a smoke. They preferred cigarettes — and here I would like to put in a plug for the local Yunnan product — but most of their smoking was done on a home-made water pipe.

This was a tremendous affair, made of a foot-long joint of bamboo and shared by all.

I wanted to witness one of the temple ceremonies, of which there were several each day. They were varied in character as I could tell from the sounds that came forth from the shrine. The ceremony at four in the morning, which involved the beating of the big gong, seemed to be the most important. But having endured what Carl Crow calls the "persistent and prying curiosity" of the Chinese about my own business I hesitated to inflict my curiosity on them in regard to such a matter as a religious service.

Some of the servants about the temple were apparently "tribal people," whether Lolos or Maotse I had not the knowledge to determine. They were a short and stocky lot and unbelievably strong. It made my own back ache merely to look at the basketsful of building stone they carried on their backs up the steep trails with the aid of a tump-line about the forehead. This was not the terrain for the usual carrying pole. They dressed mostly in old rags and cast-off western clothing which was probably left over from the time when Kunming was the great American air base in China during the war. The little old character who brought us hot water for tea delicately suggested that he would like my old hiking shoes if I saw fit to abandon them. We measured our feet. The length would do, but I doubt that those flattened feet could possibly be squeezed into them. It would probably have been his first pair of shoes and I would have liked to see him try them on!

We were almost sorry when our time was up and our friends drove up from Kunming in a jeep to take us back. The only trouble with a jeep is that it doesn't hold enough! Our two friends, their picnic basket, their dog Trixie, Professor Hsu with a huge bed roll, two Ferrises with their bed rolls and plant press and at the last moment the abbot of the monastery were stowed aboard and round about. The abbot wanted to go into Kunming and carried with him a small but heavy sack. I could not but guess that he was going into town to "bank" the silver that we had given him as our gratuity. With the help and hindrance of the whole monastery staff from the monks to the lowliest attendant, a hunchbacked half-wit known to us as Quasimodo, everything was finally stowed and tied and we chugged along the rough and rocky Burma Road back to the equally rough and rocky streets of Kunming.

END



LAWRENCE A. WILLIAMS

## afRICA BY THE GOLDEN GATE

PHOTOGRAPHS BY  
ANSEL ADAMS

Leslie Simson on safari.

"SIMSON WAS THE GREATEST of all African hunters. There's not a guide or white hunter, living or dead, who could equal him in his prime. He was a dead shot, utterly fearless, and he was a better tracker than any native I ever saw."

The speaker was Fred Heider, a Californian who accompanied Leslie Simson on three African expeditions. He had come to the California Academy of Sciences especially to see the new African exhibits. Fred walked through Simson African Hall, past the truculent gorilla, the black lechwe, the roan antelope, the zebra groups, the Beisa oryx, the lions, leopard, hunting dogs, gazelle, the magnificent water-hole group. There are 24 habitat groups in the original Simson African Hall, and Fred can tell a dozen stories about every one.

The sable antelope, for instance, were shot in an area which was at the time infested by rampant sleeping sickness. The district commissioner wouldn't permit Simson and Heider to cross to the southwestern part of Lake Victoria and enter the area until they signed papers releasing the government from all responsibility for their safety. Then they chartered an Arabic dhow from an Italian named Beneni, who ferried them across

the lake and agreed to come for them in 18 days. After they got their sable antelope, the dhow returned on schedule, but Beneni wasn't sailing it. Beneni was dead, killed by sleeping sickness, and the district commissioner was stricken. Simson and Heider, who had declined to remain in the supposedly safe settlement with these people, and who had penetrated into the "dangerous" area, were unharmed.

Pausing at the lion group, Heider shook his head ruefully. "Simson killed over 1,300 lions and assisted in taking 1,000 others. Now they only let you shoot one." Fred felt the statement needed explanation. "In the early days in Africa, lions were considered a menace to domestic stock, game, and even humans. The British colonial governments in Africa paid bounties for lions, and Simson used to shoot lions to help defray safari costs. Later it was found that lions were necessary to preserve the balance of nature. Protective laws were enacted. Simson shot no lions on his last safari."

Simson left Oakland, California, for South Africa as a young mining engineer. Nine months of the year he spent in the mines, advancing rapidly to the top of his profession. But three months of



each year — the vacation from his exacting work — he spent on safari, hunting and exploring the dark continent from Abyssinia south to the Cape.

"Simson never took a guide on safari," said Heider. "He was his own guide, his own white hunter. He knew where to find every kind of game — some in places so remote or well hidden other guides never discovered them, though they tried."

Hunters who came to Africa for big game, and then told the world about the dangers — the narrow escapes, the charging lions and rhinos, the snakes in bed and the leopards in the tent — these had only contempt from Simson. According to him, the animals of Africa will not bother you unless you bother them. If you invade their territory, shoot and wound them, that is your doing—your responsibility — and it is up to you to take care of yourself. If you can't, you deserve the consequences. Simson always insisted that his hunting mates finish off the game they had wounded. He seemed to feel that hunters who wounded animals only to have them finally killed by professional hunters were somehow cheating the beasts of an opportunity for retaliation.

Heider turned the corner into the new addition to Simson African Hall. He looked at the greater kudu. "That's the type of country the kudu loves. Might almost be a California landscape — Marin

▲ **CAPE BUFFALO** (*Syncerus caffer*).—A papyrus swamp on the north slope of Mt. Kenya, British East Africa, is the setting for this group of the African, or Cape buffalo, which range from the Cape of Good Hope north into Abyssinia and the Nile valley.

Related to domestic cattle, these animals rival prize cattle in weight—the largest bull in this group weighed nearly 2,000 pounds. The herons are cattle egrets, found over all of Africa, western Asia, and southern Europe; flocks of them follow cattle and wild animals, feeding on the small life stirred up by the moving herds.

All African buffalo belong to one species, but those in the Congo are much smaller, redder, and have straighter horns.

➤ **BONGO** (*Boöercus eurycerus*).—This harnessed antelope lives in dense tropical forest (the habitat of this group is a bamboo thicket in Kenya) in the mountains of equatorial Africa at an elevation of about 7,000 feet. Never seen in large herds, but usually alone or in groups of four or five, the shy and elusive bongos browse on leaves, twigs, bark, and rotten wood, their acute senses of smell and hearing warning them of approaching enemies.

They lay their horns back and steal silently under vines and branches which fall back to hide their escape. Unlike her relative the kudu, the female bongo has spiral horns as handsome as those of her mate.

County. . . Of course, the plants are different."

Then the bongo: "It's tough hunting them because of the heavy forests — the bamboo thickets they live in."

Looking at the buffalo, Fred recalled, "It took five shots from a Springfield and one from a .475 to bring down the bull."

That was back in 1930 when Leslie Simson was fired by the ambition to bring a bit of Africa to the



Golden Gate. To carry out his ambition, he supplied funds to the California Academy of Sciences for building Simson African Hall, and he went on a collecting expedition accompanied by Frank Tose, late Chief of the Academy's Department of Exhibits. Mr. Tose made the sketches, photographs, and field notes which were used in preparing the habitat groups.

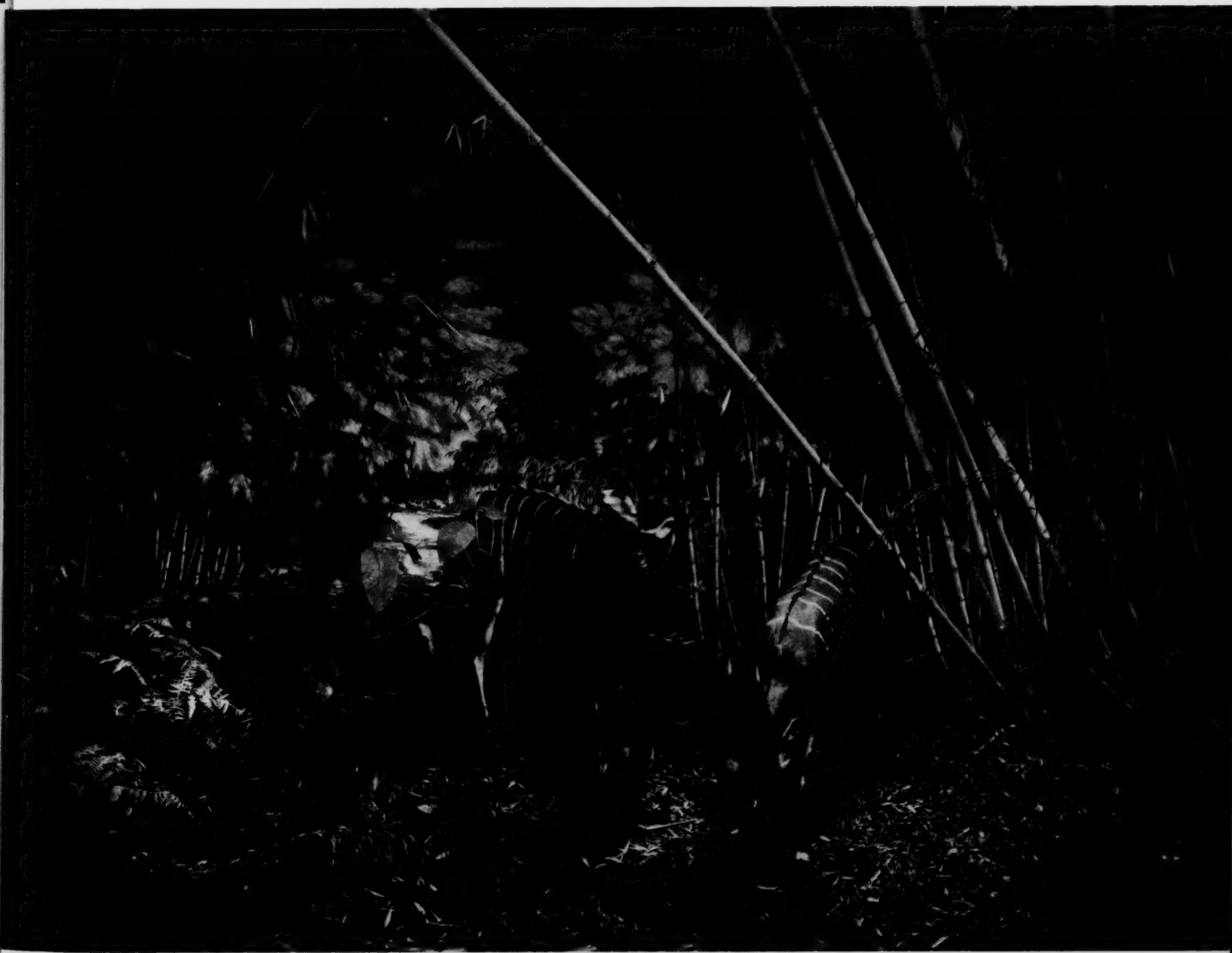
The original Simson African Hall was opened to the public in 1934. The descriptive booklet prepared at that time stated:

"The present African Hall, with its twenty-four habitat groups, is the first unit of a projected African exhibit of considerably greater scope. Mr. Simson did not live to see this larger African Hall of which he dreamed, but he made provision in his will that the plan should be carried out. This will be undertaken by the Academy as soon as world conditions permit."

This larger African Hall, adjoining the new Hall of Science, is now open to the public. Even before the new building was under construction, Cecil Tose, son of Frank Tose, had begun work on the new habitat groups, creating model dioramas from his father's field notes and sketches, modeling the animals, and taking hides out of the cold room, where they had rested for almost 20 years, to send to the tanners.

Miss Velma Harris, who had helped make the artificial plants for the original African groups, set to work making every leaf and blade of green grass and flower of wax and crepe paper and wire.

As the new building rose, the tempo of work in the Department of exhibits stepped up. Toshio Asaeda, a painstaking artist, assisted Tose in preparing the groups. He painted the background for the bongo group and installed both this and the buffalo group. Charles Dornbach worked chiefly





**GREATER KUDU** (*Strepsiceros strepsiceros*).—This Tanganyika scene is typical of the stony broken ground preferred by the wary, timid greater kudu which takes cover in dense forest or thorn brake at the first sign of danger. One of the harnessed antelopes, it is second in size to the eland, but it has the longest of all antelope horns. Only the male kudu carries them; females are nearly always hornless. Kudus bark when startled. The lesser kudu stands little over 40 inches at the shoulder, weighs 250 pounds. This greater kudu is 5 feet at the shoulder, 750 pounds.

on installation. Two Marin County artists painted backgrounds: Ray Strong, the kudu, and Belmore Browne, the buffalo. Special exhibits were installed showing the diversity of African mammals, native artifacts, and the museum techniques used in creating habitat groups. Several groups remain to be done, but the enlarged Simson African Hall is now open to visitors.

Fred Heider looked long at the buffaloes in the papyrus swamp with their companion egrets, mud and bits of dry grass on their coats, saliva trailing from the mouth of the bull — such touches added

to the life-like illusion. "The new groups are even better than the old ones," Heider said.

In San Francisco for the United Nations Conference in 1945, the late Jan Christian Smuts, soldier, statesman, and philosopher of South Africa, praised the realism of the African Hall groups and said they were unsurpassed. But now they are surpassed by the realism of the habitat groups in the new addition to Simson African Hall.

The Africa Simson knew and loved has come to life in Golden Gate Park. Heider nodded approval. "Simson would have liked it," he said. END

## REVIEWS

### Padre Pfefferkorn's Sonora

SONORA: A DESCRIPTION OF THE PROVINCE. By Ignaz Pfefferkorn (Köln, 1795). Translated and annotated by Theodore E. Treutlein, Ph.D. Coronado Cuarto Centennial Publications, 1540-1940. The University of New Mexico Press, Albuquerque. 1949. xv + 329 pp., 5 photographs by the translator, facsimile title-page of original German edition, map. \$9.50.

"Pfefferkorn's Description of Sonora" as this book is called on the dust jacket, was written by one of the Jesuits expelled from Mexico, after he had returned to Europe. It gives an interesting account of the area then known as Sonora as it was in the eleven years the author spent among the Indians as a missionary in the Roman Catholic Church. The translator did a good job in retaining many of the quaint expressions of the middle 18th century, and at the same time presenting a smoothly flowing narrative.

The book is divided into two parts, containing fifteen and sixteen chapters, respectively. The first part presents the priest's account of the geography, fauna, flora, mineral resources, agricultural possibilities, and observations on some of the customs and superstitions of the Indians and Spanish inhabitants of Sonora. The second part deals with the political, social, domestic, and religious fabric of the people, together with discussions of the languages, and habits of the Indians, the history of the Missions in Sonora prior to 1768, and a rather uncomplimentary chapter on the character of the Spaniards living in Mexico.

In places the book is repetitive, but in the main it is interestingly direct—at times blunt. The descriptions are particularly intriguing to one who has traveled in modern Sonora, for many of the place names in use today are the same as those applied two hundred years ago. Most of Pfefferkorn's observations were keenly accurate, but he shared with many others of his time—and with some travelers of more recent years—a naïve regard for the legends and old wives tales of the Indians regarding the potency of medicinal and poisonous plant and animal materials!

There is a strong parallelism between one of Pfefferkorn's bitter complaints about the high cost of living in Sonora in 1750-60's and those heard daily in our own communities. Surely, there is "nothing new under the sun."

Two appendices at the end of the narrative criticize the writings of another traveler in Mexico who wrote shortly before Pfefferkorn, and compare the prices paid for various commodities in Mexico with those asked in Europe in the same period.

The crude map is fascinating, for it shows the tremendous advances that have been made in man's knowledge of a major portion of the Mexican terri-

tones during the past two centuries. Its very crudeness lends interest.

The book is recommended to those who like Mexico and who enjoy seeing a part of that country through the eyes of a man who spent a bit better than a decade in close association with the country and its semi-barbarous Indians about two centuries ago.

IRA L. WIGGINS

Natural History Museum  
Stanford University

### Origin of plant species

#### STAGES IN THE EVOLUTION OF PLANT SPECIES.

By Jens Clausen. Cornell University Press, Ithaca, New York. 1951. viii + 206 pp., 76 text figs. \$3.75.

The modern approach to the problems of organic evolution is beautifully exemplified by this clear, readable account of the results of many years of research on various wild plants which are native to California or western North America. Nearly a century has elapsed since Darwin published *The Origin of Species* and only in recent years are biologists beginning to solve the fundamental problems of evolution. That the outstanding characteristic of the modern attack on these problems is experimental research on living organisms is abundantly illustrated in this book from the third chapter on to the end. The earlier part of the book deals with (1) the basic philosophy behind the hundreds of experiments and (2) a brief historical review of the development of ideas about the "how" of evolution.

Beginning with local populations as the basic evolutionary units, the author discusses the development of locally adapted races, of systems of races and subspecies, of interspecific barriers, and the evolution of groups of related species. The last chapter deals with the physiologic-genetic concept of species and the evolution of species and genera.

The many photographs, diagrams and tables all help to present the facts and experimental results more clearly and interestingly. There is a bibliography and an index. The format is excellent. Both author and press are to be congratulated on making available to the general public as well as to biologists such an attractive, readable and highly instructive book.

E. B. BABCOCK

Department of Genetics  
University of California  
Berkeley

### Butterfly nets and rat traps

A FIELD GUIDE TO THE BUTTERFLIES. By Alexander B. Klots. Houghton Mifflin Company, Boston. 1951. xvi + 349 pp., 247 color paintings and 232 photographs. \$3.75.

Many an amateur butterfly collector has been daunted by the size and weight of the reference material which he would often like to carry with him into the field. The standard California text, Dr. John A. Comstock's *Butterflies of California* weighs four pounds, and although it is an ex-

cellent work, it does not fit readily into the pocket of your field jacket. Recognizing the need for popular natural history texts of small size, the Houghton Mifflin Company has established its well-known Peterson Field Guide Series with Roger Tory Peterson as editor and advisor. The most recent and one of the best of the series is Professor Klotz' contribution. Although this butterfly book deals primarily with the eastern U. S. species, it makes good reading for anyone who has swung a butterfly net or ever expects to. Most commendable is the overall ecological approach, for the preserved specimen becomes more than just a pinned insect. Having worked with Dr. Klotz on wartime research projects, the writer knows him to be a most painstaking scientist. This will be readily evident to anyone who has opportunity to refer to this remarkable new butterfly guide.

EARL S. HERALD

Steinhart Aquarium,  
California Academy of Sciences

THE DUSKY-FOOTED WOOD RAT. By Jean M. Linsdale and Lloyd P. Tevis, Jr. University of California Press, Berkeley and Los Angeles. 1951. vii + 664 pp., 384 figs., 132 tables. \$7.50.

This book is the result of ten years of field and laboratory study on the dusky-footed wood rat at the Francis Simes Hastings Natural History Reservation in the Santa Lucia Mountains in Monterey County, California. During this period observations were made on 580 individual wood rats and the life cycle of many of these animals was followed from immaturity to old age. Live trapping played a major part in the study. By this method it was possible to follow the various changes associated with age, sex, season of the year, and the health of a large number of animals. The many facts compiled, therefore, make this one of the most complete life history accounts published to date on a single species of North American mammal. Although the results are based entirely on the wood rat population inhabiting the 1,720 acres of the reservation they, nevertheless, present a clear picture of the life cycle of this western rodent whose limited range extends from the vicinity of the Columbia River in southern Washington south to the Sierra San Pedro Mártir of northern Baja California.

ROBERT T. ORR

California Academy of Sciences  
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## EDITOR'S END PAPERS

### California, here they came

*Early California Travels Series.* Glen Dawson: Los Angeles. 1951.

VOL. I. NOTES ON UPPER CALIFORNIA: *A Journey from Monterey to the Colorado River in 1832.* By Dr. Thomas Coulter. v + 39 pp., frontispiece in color, insert map.

VOL. II. RECOLLECTIONS OF A PIONEER, 1830-1852: *Rocky Mountains, New Mexico, California.* By Job Francis Dye. 80 pp., frontis. portrait.

VOL. III. VOYAGE OF THE HEROS: *Around the World with Duhaut-Cilly in the years 1826, 1827, 1828 & 1829.* By Lt. Edmond Le Netrel. Translated by Blanche Collet Wagner. 64 pp., 4 illustrations.

VOL. IV. BAJA CALIFORNIA, 1533-1950: *A Biblio History.* By Don Meadows. 32 pp. + Index of Authors. Single volumes, \$5.00; by subscription to series, \$3.75.

With the Early California Travels series, in which "the publishers propose to print original accounts of early California," Glen Dawson (Dawson's Book Shop in Los Angeles is known to bibliophiles everywhere) will do two things. He will enable not more than two hundred (the edition limit) collectors of Californiana to enjoy "rare and obscure texts not generally available," in attractive format; and he will increase by so much the output of several small West Coast print shops which are or are becoming widely known for well designed and carefully printed books. Four of them—three in Los Angeles—are represented by the four volumes so far produced: I was printed by Will Cheney; II by Toyo Printing Co.; III by the Castle Press of Pasadena; IV by the Plantin Press. Though all are pleasing, production-wise, in one way or another, it must be said to collectors of press items that the last two are the best printed and bound, by a good bit; the binding of II falls short—the trend, at any rate, promises well for future volumes, and we may hope for many more of them. If Mr. Dawson continues to use a different California printer for each volume, he will not soon run out of good craftsmen.

As to what's in these little books: each of the first three makes a worthwhile contribution to pre-'49 California history by dusting authentic first-hand accounts out of such moldy ledgers of the period as the *Journal and Proceedings of the Royal Geographical Society*, 1835 (Coulter), and the French *Nouvelles Annales des Voyages*, 1830 (Le Netrel); and out of crumbling newsprint—*Santa Cruz Sentinel*, 1869—and the limbo of manuscript in the Bancroft Library (Dye). Dr. Coulter's brief report to the Royal Society is a careful scientist's outline of the lay of the land and ways of crossing it, with sharp observations on the life of Indians and settlers in contact. Dye was an intelligent, resourceful, adaptable pioneer American, native of Kentucky, a mountain man, trapper, who kept moving Westward one jump ahead of the frontier—Arkansas, the Rockies, New Mexico—to California, where he parlayed scratch into wealth via sea otter skins, livestock, gold (before the Rush), merchandise, and land. His narrative of trapping down the Gila with Ewing Young would have made a capital quote for Edwin Corle (*The Gila: River of the Southwest*, reviewed below). The *Héros* was a merchantman-tramp, we might call her today—picking it up here and putting it down there for whatever the traffic would stand, but her captain, Duhaut-Cilly, wrote a book about the voyage, which appeared four years after the present account from the diary of a junior officer, Le Netrel. What is significant is that from a routine commercial voyage of the post-discovery period have come two worthy additions to the permanent record. The California Historical Society published in its *Quarterly* (1929) the English edition of Duhaut-Cilly, which included only the California section. With Le Netrel's independent account, Glen Dawson presents "for the first time in English the story of the voyage of the *Héros* to South America, Lower California, the Sandwich



Islands and China" — and of course Alta California. This part contains some very lively observations on the Californians of 125 years ago. The four engravings in this book (reproduced from Duhaut-Cilly's Italian edition, 1841) are presumably from eye-witness drawings — subjects: Honolulu; Monterey, Alta California; Mission San Luis Rey, California; Russian settlement of Ross near Bodega. Whether direct or from memory, they too belong to the record.

Most bibliographies are just lists of books for librarians and scholars to refer to when necessary; Don Meadows' *Baja California* is one to read. "Records of the Indians, discovery, exploration, colonization, and economic development of the peninsula have been published in more than four hundred books, pamphlets, and articles. The number of references to scientific studies in the fields of biology and geology is even greater. Out of this great mass of printed material this list of sixty titles has been selected. . . In the sequence listed they give a detailed history of conditions and affairs in 'the long arm of Mexico' from the time of its discovery to the present day." What follows is a neat and connected abstract of Baja California history with the bibliographical entries inserted where they belong — what to read, in other words, for the full story of each part of the subject. Justice cannot be done the book in such few words; but perhaps we can give it no greater praise than to say that our fellow editor and Academy Librarian is greatly pleased with this *Baja California* and has purchased a copy for the Academy Library's bibliographical section.

### History on the Gila

THE GILA: *River of the Southwest*. By Edwin Corle. Volume 44 in the Rivers of America series. Rinehart & Company, Inc., New York. 1951. 402 pp., decorative drawings by Ross Santee, map by George Annand. \$4.50.

Rivers have written America's history. They have barred, channeled, transported, powered the tides of men and progress that have crept, ebbless, century by century, over America. The rivers have meandered in and out of the history books — De Soto dying on the Mississippi, Hudson sailing the Half Moon beneath the Palisades and up the "River of the Mountains," Washington crossing the Delaware, settlers moving westward down the Ohio, the Cumberland, the Tennessee — but it took a series of full-length books, biographies of rivers, to give them their due as witnesses and makers of history. Constance Lindsay Skinner planned the Rivers of America series and gave it life; Hervey Allen and Carl Carner are its present editors.

Not only have the rivers been generally shorted out of the textbooks; this writer, born and schooled in California, had put in his four years at the state university, and more in various careers, before he began to appreciate properly how much of America's history took place in the West and Southwest — how firmly established and already old so-called western civilization was, west of the Mississippi, west of the Rio Grande, decades before the first faltering colonies won a toe-hold on the Atlantic seaboard. And he had to wait for Edwin Corle's book to tell him that *The Gila* has been one of America's most historic rivers for four hundred years, to say nothing of the geologic ages it had already spent shaping the land and setting the stage.

*The Gila's* author begins his riverine biography, not with the parentage and birth of his subject — the record is still locked in the time vault of the rocks — but with a 150-million-year flashback to the time indicator of dinosaurs. The nameless Gila was already a great river, flowing broadly through swamps and coniferous forests, with man still 149 million years in the future.

It is not certain when man first appeared in the Gila basin. "Conservatively," Corle says, summarizing current anthropological guesswork, "man was on the Gila 15,000 years ago, probably more, and possibly as many as 25,000." At any rate, three recognized early American cultures merged in the Gila watershed "long before Columbus." The senior among them, the Hohokam, was marked by a skilfully engineered irrigation system, and left as its chief monument the famous Casa Grande, "America's first skyscraper."

Most of us have learned somewhere that the first "white man" to set foot in Arizona was the "huge egocentric black man," Esteban, or Estevánico ("Little Stephen"), survivor of Narvaez' wrecked Florida expedition, who led Fray Marcos de Niza by remote control to the Gila in search of the fabled Seven Cities of Cibola, and went on ahead to brag himself full of Zuñi arrows. Well, here is the full story of the *entrada* of that inventive Franciscan who kept well behind the ebony pathfinder that proclaimed himself God to the skeptical Pueblos. Here is the dusty pageant of the eagerly launched Coronado expedition, which was fired by Fray Marcos' glittering fictions. Here follow, in turn, the great Jesuit missionary, Padre Kino, for a quarter of a century "virtually the pioneer, trail blazer, father confessor, dictator, geographer, cartographer, altruist, architect, and cattle king of the Gila watershed"; and the gentle Padre Garcés, who guided the first Anza expedition to California from Tubac over the Camino del Diablo to the junction of the Gila with the Colorado near modern Yuma, and was later martyred by the Yumas near the same spot. After a few decades of stagnation and abandonment, a new era opened — the mountain men crossed the Mogollons, worked their way down the Gila's tributaries, down the river, on into California, shooting, trapping, hellraising. Here came Williams, Young, Pattie, Weaver, Smith — the rough, tough forerunners of the tide pouring westward across the American frontier. Kit Carson led General Kearny's Army of the West — one hundred men and two howitzers — to the Gila for its march on Los Angeles. The Mormon Battalion followed close on its heels, capturing Tucson on the way.

The Oatman Massacre and the Apaches; gold-mining — Corle tells the story of the Lost Dutchman and other famous mines with all the gory details; the Gadsden Purchase — why the U.S. had to move the treaty boundary south from the Gila to include what critics called "our national cactus garden"; pioneers — Jaeger, Poston, the Butterfield Overland Mail; the birth of Arizona Territory and the growth of its cities; Apaches again — Cochise, Geronimo (an armed force hunted a marauding band of untamed tribesmen on the border as late as 1930); builders of wealth — stockraising, agriculture, copper, tourists; dam building; ghost towns — Calabazas, Tombstone; statehood and maturity with a frontier flavor — such is the fabric of latterday Arizona.

Corle is a master weaver with these many-colored threads. He is at his best with the rich, ragged, noble, base, seldom sweet and often salty human drama. His prologue, walked through by a sick, tired diplodocus, is a bit gummy. The next-to-last chapter disposes of an utterly fascinating flora and fauna and geology a trifle too summarily for this and probably other readers — but there are natural history sources to turn to. What Corle has done superbly is to produce like a master director the historical play of man in a great arena of space and time. His stage is the crossroads of Southwest history and pre-history, the vast Gila River drainage system. Edwin Corle may not be a historian's historian — but history would be a far more popular subject if more of it were told the Corle way.

### Animals in your pocket

**HOW TO KNOW THE AMERICAN MAMMALS.** By Ivan T. Sanderson. Little, Brown & Company, Boston. 1951. 164 pp., 183 black-and-white drawings, 25 color plates, and 10 pages of animal tracks. \$2.50.

This handy-size, popularly priced field guide should be well received because of Ivan T. Sanderson's popularity as a writer of books about animals and his adventures in search of them—his *Animal Treasure* and one or two others were best sellers. The publishers call the present book "completely authentic and scientifically accurate," which it doubtless is for all ordinary uses; one recognized mammalogist, at least, has found some of the nomenclature old fashioned, but it is of no matter to the plain man for whom this book was written whether there are seven distinct species of weasels, or three with subspecies. He will be happy if he has seen one of our more elusive small mammals and can correctly call it a weasel — or a ferret. As to the illustrations: most of our larger mammals can be identified in the field from any adequate drawing or photograph; but it is doubtful whether you could correctly match your weasel, for instance, with the proper one of Mr. Sanderson's seven drawings — without recourse to the logical inference that the one you saw was the one belonging to your locality. In general, the author's drawings are somewhat stiff, many of them badly proportioned. Louis Agassiz Fuertes' color work will be familiar to anyone who recalls *The National Geographic Magazine* for November 1916 ("The Larger North American Mammals") and for May 1918 ("Smaller Mammals of North America"), or who was brought up on the Burgess bird and animal books. The color plates of the present work are the same in style and in technical grade of process reproduction as those of the World War I *Geographics* mentioned (they are, in fact, acknowledged on the jacket to have been originally made for *The Burgess Animal Book* — they looked like old friends, but for comparison this reviewer had at hand only the "Smaller Mammals" *Geographic*).

Critical appraisal of this little book will come from the mammalogists and other wildlife experts; the criticisms expressed and implied here are those of one for whom the book was written, who yet hopes to see as good a handbook of animals as several there are for birds, insects, and flowers. Having struggled with the problem of making mammals lifelike in black-and-white media, this writer

can fairly say that Weber and Schwartz, to mention two, are far better animal artists — but Sanderson's name will ring the bell for the bookstore browser, and he will not be getting a bad book.

### Animals over the world

**PRINCIPLES OF HUMAN GEOGRAPHY.** By the late Ellsworth Huntington. Sixth Edition, a Revision by Earl B. Shaw. John Wiley & Sons, Inc., New York. 1951. xviii + 805 pp., numerous text figures: photographs, maps, and graphs. \$6.25.

**ECOLOGICAL ANIMAL GEOGRAPHY.** By W. C. Allee and Karl P. Schmidt. Second Edition, rewritten and revised, based on *Tiergeographie auf oekologischer Grundlage*, by the late Richard Hesse. John Wiley & Sons, Inc., New York. 1951. xiii + 715 pp., text drawings and maps. \$9.50.

The proper study of man and his fellow animals on earth begins with understanding of the conditions favorable to continuous life. The problem: "the effects of the physical environment" — quoting the jacket of *Human Geography*; "how and why animals live where they do" — quoting the jacket of *Animal Geography*. Without straining the comparison, it may be said that these two classics of geographical science, handsomely presented by the same publisher in the same year, completely revised and modernized, will give both the college student and the serious general reader a thorough grounding in principles. The student will gain from their study a firm working basis for later specialization. The thinking layman will sharpen his mind and increase his understanding and appreciation of the wonderful diversity, complexity, and astonishing adaptability of earth's animal inhabitants, including man. Any intelligent reader of both books will get perspective on himself in relation to the whole stream of human life and on humankind as a part of the total animal population of the planet.

### Biography of a Movement

**FORESTS AND MEN.** By William B. Greeley. Doubleday & Company, Inc., Garden City, New York. 1951. 255 pp. \$3.00.

Here, in vigorous, often salty style, is the short biography of one of the greatest movements this nation has ever seen: the progress of American forestry from the "cut out and get out" days of blindly greedy exploitation toward the status of a respectable, stabilized, and foresighted industry. William B. Greeley qualified to tell this story by living it—beginning nearly fifty years ago as "one of Gifford Pinchot's young men," fired with the zeal for conservation; commanding, in World War I, the forestry troops of the A.E.F.; becoming Chief of the U. S. Forest Service; and finally, going to work for the West Coast Lumbermen's Association.

With confessed sympathy for both sides, Colonel Greeley has told the long and frequently bitter struggle between private interests and Federal policies, out of which a new cycle is evolving — the assurance of perpetuation along with fuller utilization of our greatest natural resource. This is a story all Americans should know.

D.G.K.



*A Mnemonicon  
to the  
Sagacious*

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FEBRUARY 2—Under the Big Top, *a day at the circus*  
9—March of the Movies, *stars of yesterday*  
16—African Animals, *big game hunting with a camera*  
23—Our Stand in Korea, *a pictorial report*

**Science Lectures** Saturdays and Sundays, May Treat Morrison Auditorium, 2:30 and 3:30 p.m. Admission forty cents and twenty cents. Members, half-price.

**SUBJECT FOR JANUARY — REPTILES**  
Harold Stein, naturalist and lecturer

**Television** Science in Action, the Academy's TV program, sponsored by American Trust Company and seen over KGO-TV, every Tuesday evening 7:00 to 7:30.

**The Museum** Open every day in the year 10 to 5, Steinhart Aquarium, North American Hall, Simson African Hall, and the new Hall of Science.

**CALIFORNIA ACADEMY OF SCIENCES**

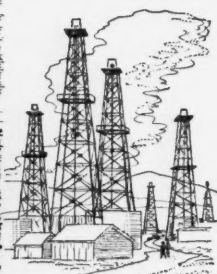
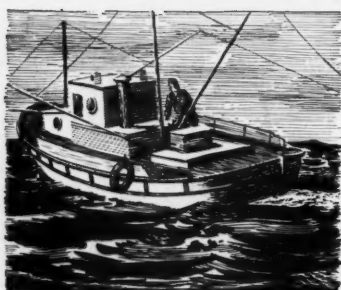
GOLDEN GATE PARK, SAN FRANCISCO



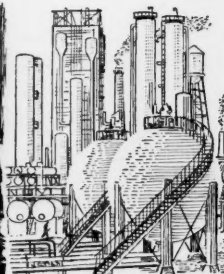
## "What's this 'integration' they're attacking you for?"

**One of the complaints** now made about big companies like Standard Oil Company of California is that they practice "integration". This word is made to sound so evil that you may wonder what it means as it's used in this case.

**The fact is that integration is common** in American businesses both large and small. They use it as a natural part of their system of increasing efficiency, cutting costs and improving products. Integration doesn't make a good company bad. To understand integration at a glance, look at this parallel:



A fisherman takes his boat onto the ocean and makes his catch. Standard discovers oil and brings it up out of the ground. If both then sell—the fisherman to a buyer at wharf-side, and Standard to some buyer at the well—there's no integration. But suppose each takes the next step...



When the fisherman cleans his own fish, he has become an integrated business. So, too, Standard. Like him, we work to put the product into the form you want. We refine the crude oil we ourselves produce—turn it into gasoline, lubricants, chemicals, and all the rest. This is integration.



If the fisherman now carries his cleaned catch to the market-place, he is further integrated, for he is now also in the transportation business... as is Standard when we operate our own pipelines and tankers to carry oil from well to refinery, or refined products to areas where they'll be used.



And if the fisherman then sells his product through a store of his own, he completes his integration. Standard does it, too, through Company-owned stations (about 1 in 7 stations where Chevron gasolines are sold). Integration helps us do better for you and the nation, and so for ourselves.

*I'd Like to Know...* Many people write to Standard asking pertinent questions about the Company. We answer all letters individually, but some points seem of general interest. We take this way of discussing them for every one. If you have a question, we urge you to write in care of: "I'D LIKE TO KNOW," 225 Bush Street, San Francisco 20, California.

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